

UNDERSTANDING THE ATTITUDES OF AND PERCEPTIONS TOWARD
ORGANIC HAIR PRODUCT USE.

by

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I. Introduction

Throughout history, women have used a myriad of cosmetic products to boost their self-esteem, attract a mate, or to gain acceptance from society¹. Unfortunately, some of these cosmetic products often contain potentially hazardous chemicals. And with innovations in technology and advancements in scientific research, scientists have now started observing associations between chemical exposures and development of cancer, reproductive abnormalities, development of allergies and sensitivities, raising concerns about health hazards in some cosmetic products (Hopkins & Manoharan, 1985; McCafferty, 1926; Packianathan & Karumbayaran, 2010; Kumar et al, 2012; Wise, Palmer, Reich, Cozier, & Rosenberg, 2011). For example, studies show that chemicals such as parabens, phthalates, sodium hydroxide, calcium hydroxide, oxybenzone, 1, 3-bis(Hydroxymethyl)-5,5-dimethylhydantoin (DMDM Hydantoin) (formaldehyde releaser) and a variety of ambiguous fragrances are widely used in daily cosmetic products. While each individual product may not contain alarming amounts of any particular ingredient, the concern lies in the cumulative exposures due to consumers' use of multiple products. Therefore, the combined use of daily cosmetics and personal care products that may contain some of these chemicals could be potentially hazardous.

In 1856, William Perkin synthesized mauveine (Picric Acid) as a dye to be used for the royal wardrobe². As a result of exposure to this compound, there was an increased incidence of bladder cancer in the industrial workers at Badische Anilin und Soda Fabrik, Bayer, IG Farben

¹ Quinn, C.R., Quinn, T.M., & Kelly, A.P. (2003). Hair care practices in African American women. *Cutis*, 72, 280-289.

² John Groopman: <https://sakai.duke.edu/access/content/group/f9e0aada-0dc5-440f-9a42-7510670ed922/Presentations/GROOPMAN%20EH%20CLASS%20DUKE%20UNIV%20MARCH%2028%202013%20Handout.pdf>

(Syndicate of Dyestuff industry Corp) who manufactured the clothing³. In addition, Para-phenyl-diamine was first used to dye furs, but once the world witnessed the compound's short processing time, versatility in color production and long lasting results, it began to be used to dye human hair as well (McCafferty, 1926). In Europe today, all products containing para-phenyl-diamine must be labeled "poison" and provide a description of the product's contents due to scientific evidence implicating its potential adverse health effects (McCafferty, 1926). Exposure to dyes containing para-phenylene-diamine have been associated with chronic eczema and dermatitis, severe aplastic anemia, loss of vision, acute renal failure, metabolic acidosis, hypocalcaemia, rhabdomyolysis, seizures, bladder cancer and skin cancer (Hopkins & Manoharan, 1985; McCafferty, 1926; Packianathan & Karumbayaran, 2010; Kumar et al, 2012). In addition, toxicity endpoints associated with application of hair relaxers include the following: chronic eczema, chronic dermatitis, alopecia (Kaur, Singh, Lin-Greenberg, 2002), and increased risk of developing uterine leiomyoma (Wise et al, 2011).

Due to their occupational exposure to substances, the International Agency for Research on Cancer (IARC) states that hair stylists and barbers are more likely to experience exposure and increased risk of the aforementioned effects when compared to other occupations (IARC, 1993). The IARC attributes the increased exposure to their frequent use of products containing chemicals listed above. However, the agency states that an increased risk of cancer from using hair dyes cannot be confirmed for personal exposures due to a lack of data (IARC, 1993). Based on these observations and known effects, concerns regarding the adequacy of regulatory policies have increased. The following is a discussion of relevant regulations.

³ John Groopman: <https://sakai.duke.edu/access/content/group/f9e0aada-0dc5-440f-9a42-7510670ed922/Presentations/GROOPMAN%20EH%20CLASS%20DUKE%20UNIV%20MARCH%2028%202013%20Handout.pdf>

A. Food, Drug & Cosmetic Act

Due to the United States' delay in the modernization of cosmetics regulations, the nation relies on the aged Federal Food, Drug, and Cosmetic Act (FD&C Act) for cosmetic product protection. Chapter VI of the FD&C Act houses the cosmetics section of the law. This portion of the law is composed of three subsections which include, *adulterated cosmetics* (1960), *misbranded cosmetics* (1970), and a *regulations making exemptions section* (1938) (FD&C Act).

The adulterated cosmetics section explains that cosmetics may not be composed of poisonous substances when used in accordance with the labeling instructions (FD&C Act, 1960).

The FDA deems a cosmetic adulterated if:

It bears any poisonous or deleterious substance which render it injurious to users under conditions of use as customary or usual; if it consists in whole or in part of any filthy, putrid or decomposed substances; manufactured to held under insanitary conditions whereby it may become contaminated with filth or may become harmful to consumers; product is not a hair dye and contains a non-permitted color additive (FD&C Act, 1960, p. 304).

While the FD&C Act prohibits use of poisonous substances, there is an exception for hair dyes. FDA vaguely defines poisonous substances as those that “may render the product injurious to users under the conditions of use described thereof or under such conditions of use that are customary or usual” (FD&C Act, 1960, p. 304). FDA also includes that a poisonous or deleterious substance may include microbial contamination. The law states that hair dye manufacturers must caution consumers by providing a statement on the product label listing compound(s) within the product that may cause irritation (FD&C Act, 1960). Additionally, chapter six of the FD&C Act states that persons using products with such cautions should conduct their own preliminary “patch tests” to evaluate whether they experience irritation (FD&C Act, 1960).

Secondly, the *misbranded cosmetics* section of FD&C Act states that a product shall be considered misbranded if it displays any of the following characteristics:

Product bears false or misleading information, there is a lack of required information, conspicuousness and readability issues with required information, misleading packaging, improper packing of color additives and deficiencies where the Poison Prevention Packaging Act requires special packaging (FDA, 2014).

Lastly, the *regulations making exemptions* section asserts that governing forces should widely disseminate a list of exempt cosmetics, as long as they are not considered misbranded or adulterated (FD&C Act, 1938). Those considered misbranded or adulterated do not qualify for the exemption list.

Essentially, the FD&C Act identifies cosmetic ingredients that do not comply with its mandates and deems them “adulterated” and/or “misbranded.” The FDA has also developed a list of prohibited and restricted cosmetic substances. Prohibited substances are ones that must not be used in cosmetic products while restricted substances must not exceed an indicated amount. The FD&C Act (1960) states that no poisonous chemicals may be used in cosmetic products [with the exclusion of those in hair dyes]. Yet, because companies can apply to FDA for exemption from public label declaration of cosmetic ingredients, ingredients are often left off labels (FDA, 2014). Given this major loophole, products often do not disclose a complete list of ingredients, leaving consumers to make decisions with missing or fragmented information.

Additionally, cosmetics are not subject to pre-market approval. This means that product companies can include the ingredients they desire, sell them on retail shelves across the nation and incur no penalization if the ingredients go undetected. Certainly, violation of outlined restrictions may cause FDA to pursue regulatory action; however, because ingredient issues are largely handled after the fact, products often reach consumers before FDA addresses them (FDA, 2014).

While many companies are focused on increasing sales and minimizing product development costs through use of inexpensive ingredients, others are developing healthier alternatives with organic and natural ingredients. The following is a discussion of the terms *organic* and *natural* as they apply to cosmetics and personal care products.

B. Organic

According to the United States Department of Agriculture (USDA), “*organic* is a labeling term that indicates that the food or other agricultural products have been produced through approved methods that integrate cultural, biological and mechanical practices that foster cycling of resources, promote ecological balance and conserve biodiversity. Synthetic fertilizers, sewage sludge, irradiation and genetic engineering may not be used” (USDA, 2014).

According to USDA’s National Organic Program (NOP), “cosmetics, personal care products and body care products that contain or are made up of agricultural ingredients, and can meet the USDA/NOP organic production, handling, processing and labeling standards, may be eligible to be certified under the NOP regulations” (see Table 1) (USDA, 2008). Water and salt are excluded from USDA’s organic ingredient percentage requirements.

Table 1: Summary of USDA's National Organic Program Requirements (USDA, 2008).

Product Type	Required Organic Ingredient Percentage	Restrictions on use of Term "Organic" on Labels	USDA Organic Seal Allowed on Product	Non-organic Ingredients Required to Appear on National List of Allowed & Prohibited Substances List	USDA-accredited Certifying Agent Name and Address Required on Product
100% Organic	100%	No restrictions	Yes	N/A	Yes
Organic	95% Minimum	No restrictions	Yes	Yes	Yes
"Made with organic xxx"	70% Minimum	Up to 3 organic ingredients on front label	No	No	Yes
Products Made with Less Than 70% Organic Ingredients	No requirement	Can be listed on back ingredient panel only	No	No	No

However, USDA affirms that they have "no authority over the production and labeling of cosmetics, body care products and personal care products that are not made up of agricultural ingredients, or do not make any claims to meeting USDA organic standards" (USDA, 2008). It is important to note that other organic certifying agents exist and have their own set of qualifying standards. Notably, the FDA does not define or regulate the term "organic," as it applies to cosmetics, personal care products and body care products⁴. This means, products made with synthetic ingredients can make organic claims with no penalty from USDA or FDA.

C. Natural

Unlike their National Organic Program, USDA does not have standards or regulations for the term *natural* as it applies to cosmetics, personal care and body care products. Thus, the Natural Products Association (NPA), a domestic non-profit organization dedicated to the natural

⁴ <http://www.fda.gov/cosmetics/productsingredients/products/ucm115449.htm>

products industry, has developed a standard and certification process for personal care products. NPA defines *natural* as “ingredients that come from or are made from a renewable resource found in nature (Fauna, Flora, Mineral) with absolutely no petroleum products” (NPA, 2014). The NPA states, “all products labeled or branded *natural* must be made with 95% natural ingredients (excluding water)” (NPA, 2014). The NPA also includes that natural products may “contain only synthetic ingredients specifically allowed under the standard and environmentally-friendly ingredients that are nurturing to us and as harmless as possible to the Earth” (NPA, 2014).

Fundamentally, due to the lack in oversight of cosmetic ingredients and little enforcement of national laws, manufacturers have the ability to formulate products with their chosen ingredients and not list them on the label—as done with phthalates (used in fragrances) and a variety of other chemicals (Duty et al., 2003). In order for regulatory acts like the FD&C Act to be effective at protecting consumers, the United States government should consider modernizing it to require that chemicals used in cosmetic products are scientifically tested and proven to have a low hazard profile prior to market release. Governing officials should also ensure that manufacturers construct labels that are easily understood by general consumers.

Given the known toxicity and potential health effects associated with chemicals found in commonly used hair products, the goals of this project were to promote awareness of the hazard profiles for several chemicals present in routinely used hair products, to better understand the perceptions of and attitudes toward organic hair product usage and ultimately to encourage consumers to research product components before purchasing. To accomplish these goals, the Environmental Working Group’s Skin Deep Cosmetic Database was used as a resource to obtain product toxicity information and discuss their rankings with consumers.

II. Hypotheses:

The following two hypotheses were considered for this project:

- **Ho1:** Organic product pricing, hair type and lack of confidence in organic product efficacy will have no effect on organic product use.

Ho2: Informing participants of the Environmental Working Group's rating of non-organic product ingredients will not change consumer attitudes toward researching products prior to purchase.

To address these hypotheses, a small population of consumers in Durham, NC were asked to participate in a survey. Responses were reviewed to determine which variables most influenced consumer purchasing decisions. To understand whether having access to tools like the Environmental Working Group's Skin Deep Cosmetic Database are effective at improving opinions toward organic/all-natural product use, participants were then asked to provide the name of their most commonly used hair product. Once obtained, product names were entered into the Environmental Working Group's Skin Deep Cosmetic Database. Participants were shown EWG's rating and reported health information on their product then asked if the information would deter their use of the product in the future.

III. Methods/Materials:

Survey questionnaires were distributed to students attending Duke University and hair stylists completing cosmetology training at the Durham Beauty Academy between November 2013 and January 2014. This study was approved by the Institutional Review Board (IRB) of Duke University and informed consent was obtained from each participant prior to collecting data. Study participants completed a 17-question survey (see Appendix I) requesting information regarding the types of hair products they currently use and their perceptions of and attitudes toward organic/natural alternatives. The second component of the survey asked participants about their perceptions of and attitudes toward traditional hair products after they were shown product ratings from the Environmental Working Group's Skin Deep Cosmetic Database. All data collected from the surveys was entered into an electronic database (de-identified) and analyzed for trends using Microsoft Excel. Following completion of the survey, and as compensation for their time, participants received a free sample of *Badger Bodycare's* USDA certified organic lip balm.

Environmental Working Group Product Ratings

According to their website, products found in EWG's Skin Deep Cosmetic Database are assigned both a hazard rating and a rating for data availability. EWG hazard ratings were developed to reflect known and suspected hazards associated with ingredients and products (EWG, 2014). While the hazard score is representative of potential health hazards, the organization states that "they do not account for exposures and individual susceptibility—factors which will drive health risks—if available for assessment" (EWG, 2014). Hazard ratings are numeric rankings labeled as *low*, *moderate* or *high* concern categories (EWG, 2014). These

numeric ratings range from 0 (*low concern*) to 10 (*high concern*) (EWG, 2014). EWG also rates products based on data that are available for product ingredients.

Ratings of “data availability” were developed to demonstrate the amount of data analyzed to develop hazard ratings for an ingredient or product (EWG, 2014). The data availability rating is a combination of two factors, “the scope of ingredient safety data contained in Skin Deep and the number of studies available in the scientific literature” (EWG, 2014). Ratings of data availability are displayed as *none*, *limited*, *fair*, *good* or *robust* (EWG, 2014). Essentially, the rating conveys how much scientists know about an ingredient. It is important to note that not all cosmetic ingredients have been systematically reviewed or tested. Therefore, the fewer data there is on an ingredient, the more ambiguous is the understanding of health risks.

Product Rating Examples:

Figure 1 below is an example of EWG’s Skin Deep analysis of *Tresemme’s Naturals Vibrantly Smooth Shampoo*. Within the scorecard one notices the product’s overall hazard score, data availability rating, ratings of each individual ingredient and health concerns associated with individual ingredients. Given the product’s overall hazard rating, the product is considered moderately hazardous. However, the product’s data availability score reflects the limited data available for this product overall, suggesting that there are data gaps in the current understanding of potential health hazards from ingredients in this product.

In addition, the scorecard displays health concerns associated with exposures from product use based on the ingredients it contains. These concerns include low concern for cancer, low concern for developmental & reproductive toxicity and moderate concern for allergies &

immunotoxicity. According to the ingredient content list, the product contains DMDM Hydantoin, a formaldehyde releaser associated with cancer, allergies, immunotoxicity and irritation to skin, eyes and lungs⁵.

⁵ http://www.ewg.org/skindeep/product/472207/TRESemme_Naturals_Vibrantly_Smooth_Shampoo/

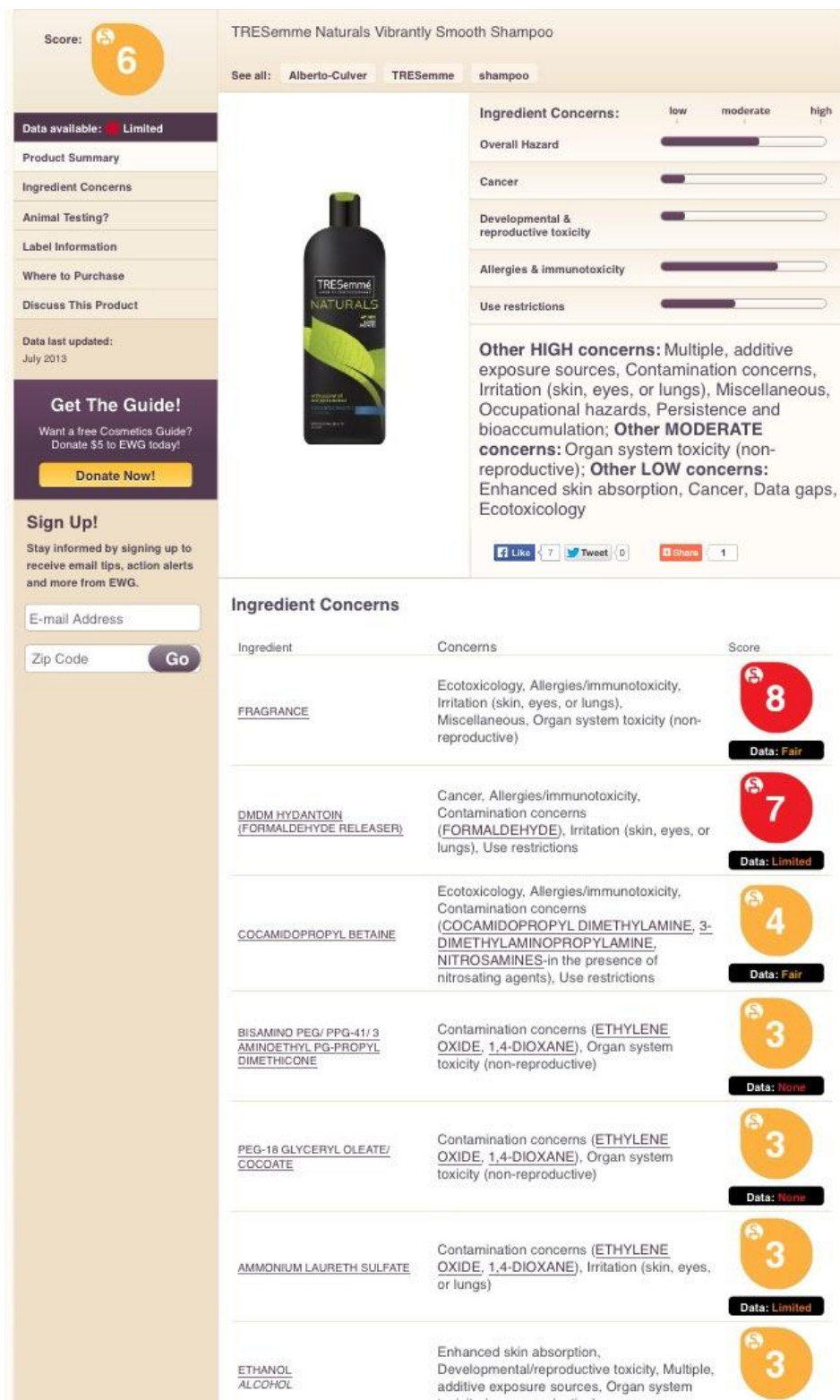


Figure 1: Example of EWG's product rating system

IV. Results

A total of 47 participants were recruited to participate in the study, including 27 Duke undergraduate and graduate students and 20 hair stylists. Study participant ages ranged from 18-42 years. The participant sample was a diverse group that contained 28 Non-Hispanic blacks (60%), nine non-Hispanic whites (19%), six Asians (13%), two Hispanic participants (4%), one Multi-racial participant (2%) and one participant who did not disclose their race (2%).

A. Duke Students

The Duke Student participants consisted of 27 individuals, ages ranging from 18-31 with an average age of 23 years. The racial distribution for the group included nine Non-Hispanic blacks students (33%), nine non-Hispanic white students (33%), six Asian students (22%), two Hispanic students (8%) and one Multi-Racial student (4%).

1. Chemical Processing

To get a sense of the types of chemicals to which the group was exposed through hair product use, students were asked whether they chemically process their hair and to identify the treatments they receive. All students (100%) reported that they did not chemically process their hair. However, when asked if they color treat their hair, six students (22%) responded “yes.”

2. Pricing & Product Use: traditional vs. all-natural/organic

When asked whether price influences their hair product purchasing decisions, 24 students (89%) reported “yes.” 25 students (93%) reported that they spend \$1-30 per month on products while two students (7%) reported spending \$31-60 on products each month. Students were then

asked if they use organic/natural products to maintain their hair. Eight students (30%) said they do not because organic/natural products are too expensive, five students (18%) reported that they currently use all-natural/organic and four students (15%) said they do not because there aren't many available for their hair type. Three students (11%) reported that they do not use organic/natural products because they aren't effective at managing their hair type. The remaining portion of the students (26%) selected "other" and provided a combination of reasons for not using organic/natural products such as, "I just haven't tried to search for them," "I don't really think about it" and "I usually use what others recommend to me." Responses are displayed in Figure 2 below.

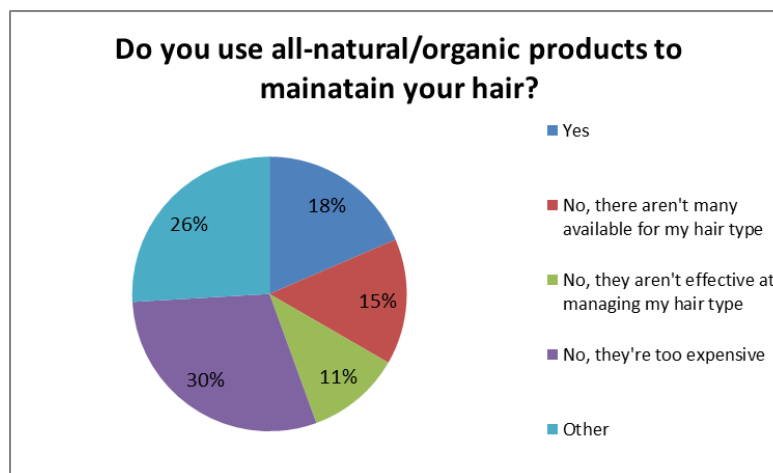


Figure 2: Quantifying student use of organic/natural hair products (n=27).

Additionally, when asked "How much would you be willing to pay if a hair products contained all natural and/or organic ingredients & provided the same treatment effects?" 19 students (70%) selected \$1-30 and eight students (30%) said they would be willing to spend \$31-60 each month. When asked "If there were two products being sold for the same price--one traditional & the other all natural/organic, which product would you choose?" 22 students (81%)

selected “all-natural/organic,” four students (15%) selected “traditional” and one student (4%) said “it doesn’t matter as long as it works.”

In addition, when asked whether certified natural and/or organic seals (logos) influence their opinion of a hair product, 20 students (74%) said “yes.” Students were asked to name the logos they commonly looked for. They identified the following: “USDA Certified Organic,” “organic,” natural ingredients, “BPA-free,” “All Natural,” “no ‘x’ chemical,” “no alcohol,” “no animal testing,” “biodegradable,” “no nitrates,” organic labeling, “sulfate free,” “Rain Forest Alliance” and “made with organic tea-tree oil.” One person said, “Can’t think of any off hand, but if I see a logo, I’m more willing to look at the product.” Another said they look for “popular/well-known products.” Students were also asked whether product efficacy (effectiveness) influences their opinion of a product, and 26 students (96%) responded “yes.”

3. Consumer Research Practices

To determine whether research findings impact student opinions of products, participants were asked whether they research their products before purchasing. Here research is defined as the behaviors participants display to learn more about the products they use. Participants were able to select more than one research technique. 17 students (63%) said “no.” Of the students who provided information regarding their research techniques, eight (30%) read labels to determine ingredients sounded harmful, seven (26%) asked friends about their experience with products, five said not applicable (18%), four (15%) asked their stylist and three (11%) identified ingredient effects and uses on the internet. Results are displayed in figure 3 below.

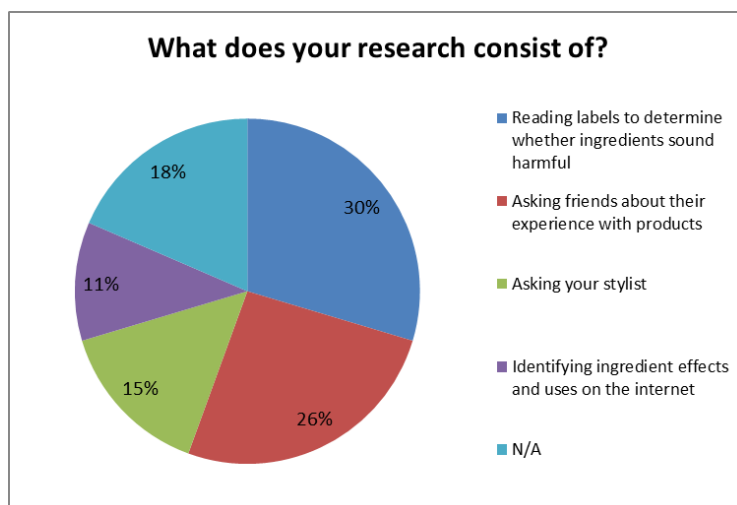


Figure 3: Student research techniques (n=27)

Finally, when asked, “Do the health effects associated with non-organic hair product use deter you from purchasing these products?” 18 students (67%) selected “yes.”

B. Hair Stylists

The hair stylist group consisted of 20 individuals, ages ranging from 20-42 with an average age of 28 years. The racial distribution for the group included 19 non-Hispanic black stylists (95%). One participant did not disclose their race.

1. Chemical Processing

To characterize stylist chemical exposures, participants were asked whether they chemically process their hair and if so, to disclose the type of process utilized. 13 stylists (65%) indicated that they chemically process their hair. Of those who chemically process their hair, four (20%) utilizes relaxers, one person (5%) bleaches their hair, another person (5%) colors their hair and one person (5%) uses the Brazilian Blowout. The Brazilian Blowout⁶ is a hair

⁶ <http://www.brazilianblowout.com/original.aspx>

product applied to curly, kinky or otherwise unruly hair to straighten it. To achieve optimal results, the product is combed through the hair from root to tip. The hair is then blow-dried straight, flattened with a flat iron and then rinsed. After rinsing, the hair is towel-dried and the Brazilian Blowout Masque is applied to seal the product previously applied. After a 60-second wait time, the hair is rinsed again and the Brazilian Blowout Smoothing Serum is applied to the hair. Lastly, the hair is blow-dried and straightened for the final straightened result.

Following selection of chemical processes used on their hair, stylists were asked to share how often processing was applied. There are two participants who process monthly, three who process every 2-4 months, one who processes every 5-7 months and two people who process their hair once a year. In addition, stylists were asked whether they color treated their hair. Responses reveal that 12 of the hair stylists surveyed (60%) color treated their hair.

2. Pricing & Product Use: traditional vs. all-natural/organic

When hair stylists were asked whether they use all-natural/organic hair products to maintain their hair, 70% responded “yes.” Those who do not use all-natural/organic products provided the following reasons for their behavior. One stylist said all-natural/organic products aren’t effective at managing their hair type. Another said all-natural/organic products contain the same chemicals found in traditional products. One person said they don’t use all-natural/organic because they’re too expensive. Another stylist said they use nothing other than their body wash. And the final stylist said, “I don’t use all-natural/organic products specifically, they look at what’s in the product.” Stylist responses are displayed in Figure 4 below.

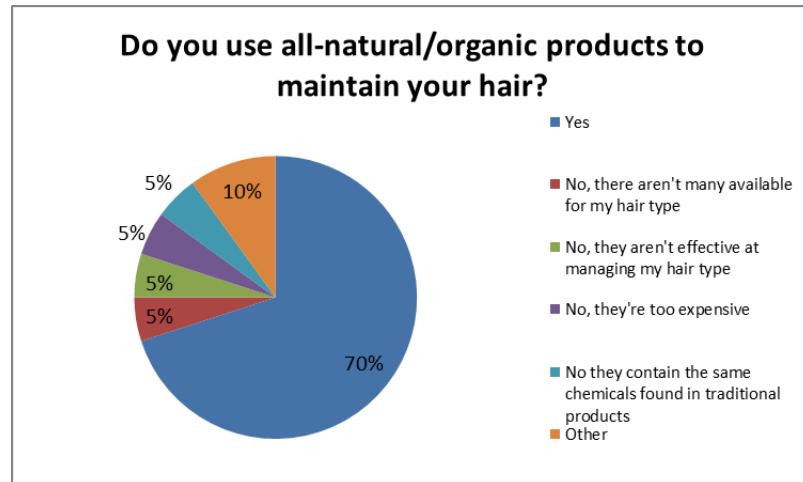


Figure 4: Quantifying stylist use of organic/natural products (n=20).

To determine whether price is a contributing factor to consumer purchasing decisions, stylists were asked if price influences their hair product purchasing decisions. Half of the stylists responded yes and the other 50% said “no.” To understand consumer spending behaviors, stylists were asked how much they spend on products monthly. Responses reveal that nine stylists (45%) spend \$31-60 monthly, five stylists (25%) spend \$1-30, five stylists (25%) spend \$61-90 and one stylist (5%) spends over \$100 monthly.

Table 2: Compares influence of price on current hair product purchasing for students and stylists (n=47).

Influence of Product Price: Students vs. Stylists				
Question	Students		Stylists	
Does price influence your hair product purchasing decisions?	89% Yes	11% No	50% Yes	50% No
How much do you spend on hair products monthly?	<ul style="list-style-type: none"> 93% spend \$1-30 monthly 7% spend \$31-60 monthly 		<ul style="list-style-type: none"> 25% spend \$1-30 monthly 45% spend \$31-60 monthly 25% spend \$61-90 monthly 5% spend over \$100 monthly 	

Additionally, when stylists were asked how much they would be willing to spend on all-natural/organic products if they provided the same treatment effects, ten stylists (50%) would spend \$31-60, five stylists (25%) would spend \$1-30, three stylists (15%) would spend \$61-90 and two stylists (10%) would spend over \$100 monthly. Next, the participants were asked, “if there were two products being sold for the same price--one traditional & the other all natural/organic, which product would you choose?” 16 stylists (80%) said they would choose the all-natural/organic product, while four stylists (20%) said they would select the traditional product.

Table 3: Comparing the influence of price on all-natural/organic hair product purchasing between students and stylists (n=47).

Influence of Product Price: Students vs Stylists		
Question	Students	Stylists
How much would you be willing to spend on all-natural/organic products if they provided the same treatment effects as traditional products?	<ul style="list-style-type: none"> • 70% would spend \$1-30 monthly • 30% would spend \$31-60 monthly 	<ul style="list-style-type: none"> • 50% would spend \$31-60 monthly • 25% would spend \$1-30 monthly • 15% would spend \$61-90 monthly • 10% would spend over \$100 monthly

Furthermore, participating stylists were asked whether all-natural/organic seals (logos) influence their opinions of hair products. 11 stylists (55%) selected “no” while nine stylists (45%) selected “yes.” Participants were then asked to name some of the logos they look for when purchasing products. The following is a list of logos mentioned: the natural tree symbol, “Certified Organic” logos, “UDSA Organic,” “A Green Source,” “Natural Products Association

Certified”, “All natural,” “all organic,” “non-animal tested,” “Shea Moisture,” “Carol’s Daughter,” “Mrs. Jackie” and “Moroccan.”

The survey also inquired about whether product efficacy (effectiveness) influences purchasing decisions. 17 stylists (85%) responded “yes.”

3. Consumer Research Practices

To better understand how the stylist sample formulated their opinions of hair products, participants were asked whether they researched products before purchasing. 80% of the stylists surveyed said they did research products. Reaching for more specific information regarding consumer research, participants were asked to share the type of research they conduct on hair products. The results are described and presented in Figure 5 below.

Twelve stylists (60%) read labels to determine whether ingredients sound harmful. Eight (40%) identify ingredient effects and uses on the internet. Four others (20%) ask their friends about their experience with products. Three (15%) selected “Not Applicable.” One person (5%) asks their stylist. Another participant (5%) asks their doctor about hair products. Participants were able to select more than one research technique.

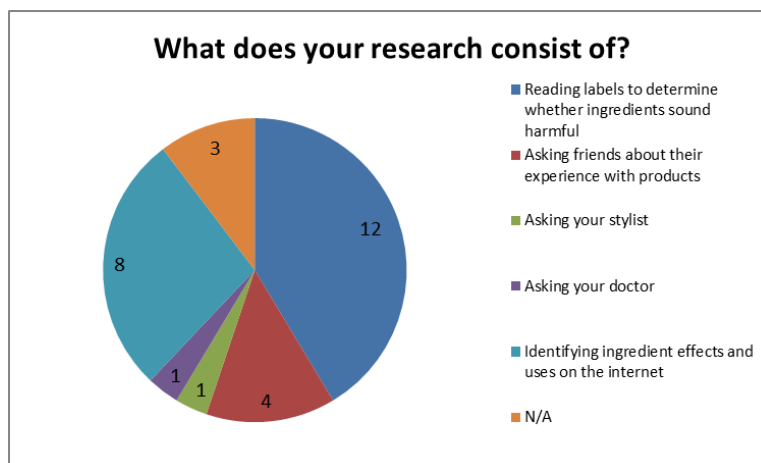


Figure 5: Summary of stylist research techniques (n=20).

After being presented with the Environmental Working Group’s rating and health information on their most commonly used product, stylists were asked if the health effects associated with non-organic hair product use would deter them from using non-organic products. 80% of stylists responded “yes.”

C. Environmental Working Group Score Distributions

Participants were asked to identify the shampoo they commonly used and the product was queried in the EWG database. The following is a review of the Environmental Working Group’s Skin Deep Cosmetic Database ratings of shampoos, hair straightening products and hair dyes. A discussion of the distribution of product ratings is important to this analysis as it illustrates the types of products available for consumers to purchase. This information conveys the range (or lack thereof) in products available to consumers. Since product manufacturers often renew and improve their products, EWG designates products with ingredient information dating prior to 2011 as “old product formulations.” Products with ingredient information obtained in 2011 and later are considered “current” and up-to-date (EWG, 2014). It is important to note that Skin Deep is updated very frequently. When updated, new products and ingredients are added

and ratings are adjusted based on increases in data availability. Therefore, it is important to note the date in which the database was accessed when discussing product ratings.

1. Shampoos

As of February 28, 2014, there were a total of 3,071 shampoos, both current and old product formulations, listed in the Skin Deep database. The range of scores was 0-10 with 768 shampoos rated “5,” 541 shampoos rated “4” and 474 shampoos rated “6” as shown in Figure 6 below.

Products classified as “low hazard” primarily contained saponified plant oils in their ingredient lists while products categorized as “high hazard” often contain cocoamide DEA, one or more of the paraben family (isobutyl, propyl and butyl), fragrance, geraniol, diazolidinyl urea (formaldehyde releaser) and octinoxate to name a few.

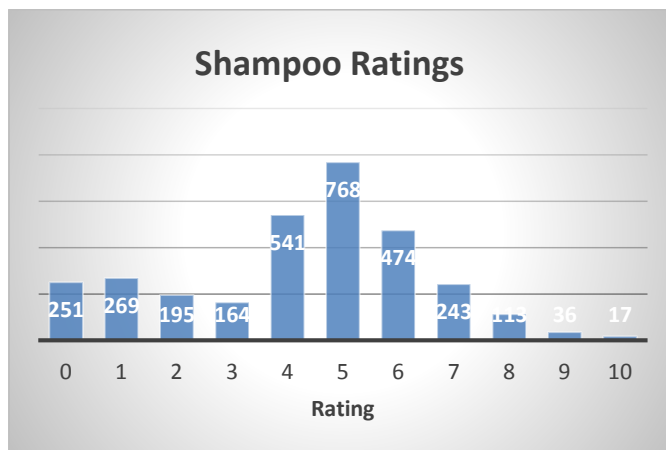


Figure 6: Distribution of EWG's hazard ratings for shampoos (n=3,071).

2. Straightening Products

Of the 36 straightening products listed in EWG's database, seven received a rating of "10"—the highest rating possible, seven others received an "8" and six other hair straightening products received a rating of "5." The range of hair straightening product ratings was 0-10. Figure 7 below provides a complete review of hair straightening product ratings. Products categorized as "low hazard" are largely botanical based products void of synthetic ingredients. Examples of ingredients present in straightening products considered "low hazard" are opuntia tuna fruit, fucus vesiculosus extract and lysolecithin. Conversely, products that fall into the "high hazard" category often contain one or more of the following ingredients: DMDM hydantoin (formaldehyde releaser), fragrance, propylparaben, calcium hydroxide and sodium hydroxide to name a few.



Figure 7: Distribution of EWG's hazard ratings for straightening products (n=36).

To determine potential differences in ratings for all straightening products and those marketed to ethnic women, ethnic straightening product scores were reviewed separately. Interestingly, ethnic straightening product ratings fall exclusively in EWG's "high hazard" category, as all ratings range from 7-10. 14 ethnic straightening products are rated "8," 11 are

rated “9” and seven are rated “10.” Figure 8 below summarizes ethnic straightening product scores.

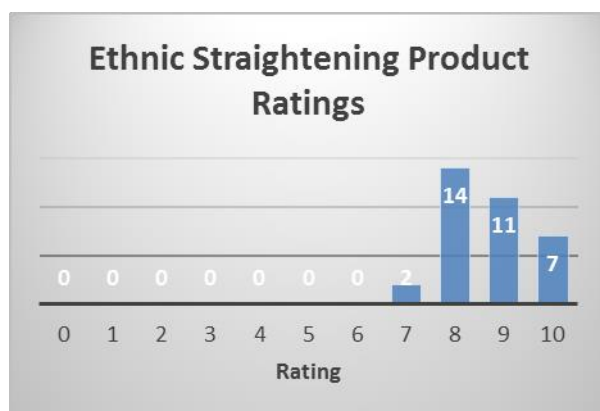


Figure 8: Distribution of EWG’s hazard ratings for ethnic straightening products (n=34).

In addition, ethnic straightening products developed for children received hazardous scores from EWG’s Skin Deep, as well. For example, *Just for Me*—an ethnic children’s relaxer received a rating of “9” and Beautiful Beginnings received a rating of “8.”

3. Hair Dyes

Lastly, of the 1,509 hair dyes present in the Skin Deep Cosmetic Database, 531 products were rated “8,” 257 were rated “9” and 185 were rated “7.” The ratings ranged from 0-10 as shown in Figure 9 below. Dyes categorized as “low hazard” had ratings ranging from 0-2. These dyes were largely botanical based and utilized *lawsonia inermis* (henna) as the primary ingredient. Hair dyes considered “high hazard” often included the following ingredients in their formulations: sodium hydroxide, resorcinol, ethanolamine, p-phenylenediamine, p-aminophenol, oxybenzone, BHA, fragrance and the paraben family (isobutyl, propyl and butyl). Hair dye ratings are presented in Figure 9 below.

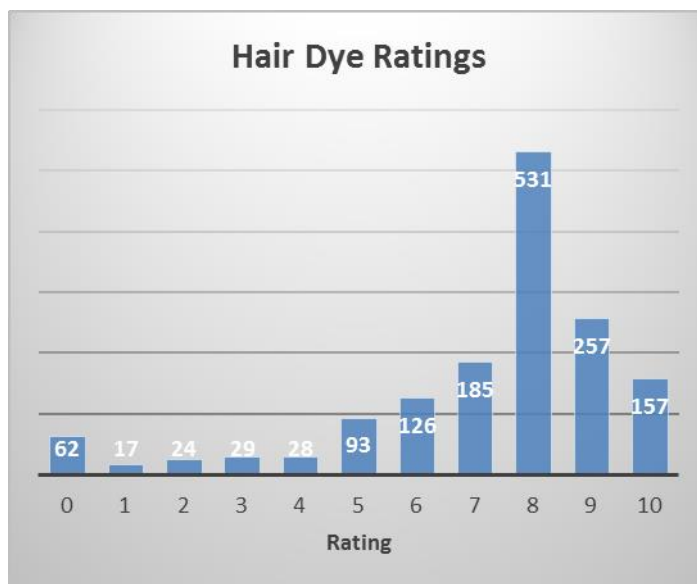


Figure 9: Distribution of EWG's hazard ratings for hair dyes (n=1,509).

4. Participant Score Distributions

After entering students' most routinely used shampoos into the Skin Deep Cosmetic Database, it was determined that 14 students' shampoos received a rating of "4," and six received a rating of "5." The range in student shampoo ratings is 1-6. 27 students were sampled. Similarly, stylist shampoo ratings range from 1-5 with eight at rated "4" and five rated "5." Figures 10 and 11 below display distributions for both groups.

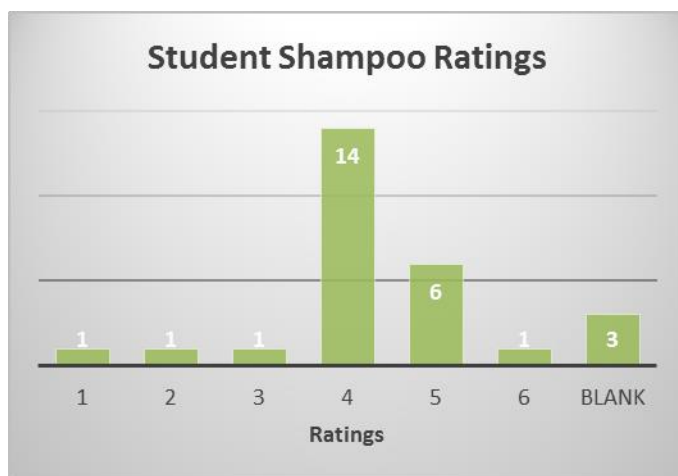


Figure 10: Summary of EWG hazard ratings for shampoo products used by Duke student sample (n=27).



Figure 11: Summary of EWG hazard ratings for shampoo products used by stylist sample (n=20).

V. Discussion

A. Duke Students

Based on the data obtained from Duke student participants, it seems that consumers are most concerned with affordability and product efficacy when making hair product purchasing decisions. This information suggests that students who have minimal financial flexibility may be forced to purchase potentially hazardous products simply because organic/all-natural alternatives often fall out of their price range. However, since 29% of Duke students reported use of organic/all-natural products and 81% stated they would choose all-natural/organic products if they were the same price as traditional products—if they delivered the same treatment effects, suggests they have an interest in purchasing healthier alternatives.

Even further, 74% of students agreed that all-natural/organic seals/logos influence their decision of a product. This finding demonstrates that consumers are aware of the differences in products available on the market and tailor their purchasing based on product certifications. Information of this kind communicates to manufacturers that consumers desire certified natural/organic products. Perhaps this information could encourage more manufacturers to pursue certifications. Companies who pursue certifications would then be expected to eliminate and/or reduce the amount of synthetic and potentially toxic ingredients from their products.

Interestingly, the majority (63%) of Duke student participants do not research products prior to purchasing. Those students who do research their products, often rely on recommendations from friends, online blogs, YouTube videos and/or recommendations from their hair stylist. While these sources can provide some insight on product effectiveness, they are largely opinion based and lack scientific support. Primary utilization of said sources could

perpetuate false and/or unsubstantiated statements regarding products and their safety. However, not all students rely on opinion-based sources when conducting their product research.

For instance, some Duke participants mentioned asking their doctor or using the internet to research uses and effects of product ingredients. Utilizing these types of research methods provides consumers with more accurate information based on empirical findings versus the layperson's review of their experience with products.

Furthermore, Duke students indicated that they would read product labels to determine whether ingredients sound harmful, but they were not always sure what the ingredients were. Thus, the final question of the survey sought to assess how students would respond once given EWG's hazard rating and summary of potential health concerns associated with exposure to their most commonly used products. Although informing student participants of potential health effects associated with non-organic/all-natural product use promoted their awareness of concerns and potential outcomes, 33% of the students said that the information would not affect their future product use. The bulk of student products analyzed received *moderate hazard* scores that ranged from 3-6 in EWG's Cosmetic Database. Students often commented that moderate hazard scores were "o.k." or "not that bad" and that they would continue using the product(s) because they like their results. Other students communicated that they had trouble finding products that provided their desired results and now that they have found effective products they can afford, they are not willing to start over again. Comments such as these drive home the importance of product effectiveness and price.

B. *Hair Stylists*

Like Duke Students, hair stylist participants were most concerned with product efficacy and price. When asked if they use organic/all-natural products, 70% of stylists said yes, but when

asked to name the products, multiple stylists named non-organic/non-all-natural products. Therefore, there seems to be consumer misconception regarding the products that are legitimately organic or all natural and those that are not. This finding is important because it reveals the disconnect between product companies and consumers. All too often products are assumed safe simply because of the language highlighted by the manufacturer and lack in consumer research. Incorporating a survey question asking participants to provide their interpretation of the terms organic and natural would have been beneficial in pinpointing discrepancies.

Additionally, 80% of participating stylists agreed that if an all-natural/organic product elicited the same effects of their traditional products, they would choose the all-natural/organic option. This finding illustrates notable interest in healthier alternatives in both student and hair stylist sample groups. Perhaps hair product companies will identify said interest as a profitable market opportunity and respond with development of safer alternatives.

Furthermore, 35% of participating stylists chemically process their hair. At present, there is no comparable alternative to the ethnic hair relaxer. Thus, gaps in product availability leave ethnic women without low hazard products for straightening their hair.

Additionally, participants state that they will begin referencing EWG's Skin Deep Cosmetic Database when purchasing products. However, I believe that the lack in diversity observed in existing all-natural/organic products will be discouraging for some consumers. For instance, when comparing traditional hair dyes to 100% pure henna hair dyes, one notices the intensity and variety of color is minimal when using pure henna as opposed to the vibrant colors achieved with traditional hair dyes. I foresee the lack of flexibility connected to pure henna use

detering many consumers from utilizing the alternative. The lack in flexibility noted here can be applied to many other all-natural/organic hair products as well.

Lastly, stylist shampoo ratings also met EWG's *moderate hazard* criteria. Since over 50% of stylists chemically straighten or color their hair, they were also curious about the scores their hair coloring and relaxing products received. As illustrated in Figure 8, ethnic straightening product ratings fall exclusively in EWG's *high hazard* category. This finding is concerning not only because ethnic stylists are applying hazardous chemicals to their own bodies but they are applying them to others as well. The cumulative exposures incurred through personal and professional use of high hazard chemicals puts stylists at an elevated risk of experiencing adverse health outcomes. Based on these observations, the following recommendations have been developed as ideas to guide consumer purchasing and product companies who want to improve their messaging to consumers.

VI. Recommendations

Organic/All-natural product companies

Since survey participants appreciated learning about EWG's Skin Deep Cosmetic Database and Smartphone application, and expressed interest in researching safer alternatives with lower ratings, manufacturers might consider displaying the EWG rating on product labels. Doing so could attract many individuals who are looking for safer alternatives, therefore, increasing company sales. However, because the Skin Deep database is always evolving, displaying EWG's rating at the time the database was accessed may not reflect the product's most current rating. Therefore, including a statement encouraging consumers to visit EWG's database is a feasible option for companies who want to communicate their commitment to being transparent about ingredients present in their products. Doing so would also illustrate the company's support of consumers making informed decisions about their products.

Secondly, organic/all-natural product manufacturers should keep in mind that accessibility plays a major role in consumer satisfaction. Currently, organic/all-natural products are readily available online, but not as available in stores. Expanding product availability to include heavily shopped cosmetic retailers e.g. Wal-Mart, Walgreens, CVS and dollar stores could increase sales, significantly.

Thirdly, since price is a primary factor driving consumer purchasing decisions, organic/all-natural product companies should consider offering student discounts. Doing so would allow organic/all-natural brands to build rapport with consumers with the expectation that once they become employed, they will remain loyal customers who pay full price for products. Offering a student discount could also foster generational adoption of products, as parents often direct their children to use the products they use.

Consumers

As mentioned previously, the consumers sampled in this study often relied on non-scientific sources such as friends' recommendations, blogs, video blogs and You-Tube videos when forming their opinions of hair products. While these sources can provide insight to a product's effectiveness, they should not be heavily relied upon for product safety information. Consumers should instead utilize scientifically supported sources to obtain product safety information as these sources are based on empirical testing and chemical behavior. Recommended sources for researching hair products or product ingredients include the Environmental Working Group's Skin Deep Cosmetic Database (Smartphone application available for download), PubMed and ChemSpider.com to name a few.

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VIII: Appendices

Appendix I: Approach/recruiting statements made:

Hello, my name is Brit'ny Hawkins. I am a second year Master of Environmental Management candidate here at Duke. I am currently working to complete my master's project on perceptions of and attitudes toward organic/natural hair product use. Could you spare 10 minutes of your time to complete my survey? Study participants will receive a free sample of organic lip balm upon completion of the survey. Thank you!

Appendix II: Survey Questionnaire

Date: _____

Study ID Number:

Name:

Contact Number:

Demographic Information

Age: _____

Race: _____

Ethnicity: _____

Occupation: _____

1. How do you classify your hair type?
 - a. Straight & manageable
 - b. Straight & unmanageable
 - c. Straight & thin
 - d. Straight & thick
 - e. Curly & manageable
 - f. Curly & unmanageable
 - g. Curly & thin
 - h. Curly & thick
 - i. Kinky & manageable
 - j. Kinky & unmanageable
 - k. Kinky & thin
 - l. Kinky & thick
2. Do you chemically process your hair?
 - a. Yes
 - b. No
3. If yes, do you use...
 - a. Relaxers
 - b. Texturizers
 - c. Brazilian Blowout
 - d. Other: _____
4. How often do you chemically process your hair?
 - a. Monthly

- b. Every 2-4 months
 - c. Every 5-7 months
 - d. Every 8-10 months
 - e. Once a year
- 5. Do you color treat you hair?
 - a. Yes
 - b. No
- 6. Do you use organic/natural products to maintain your hair?
 - a. Yes
 - b. No, they're too expensive
 - c. No, there aren't many available for my hair type
 - d. No, they aren't effective at managing my hair type
 - e. No, they contain the same chemicals found in traditional products
 - f. Other: _____
- 7. Does price influence your hair product purchasing decisions?
 - a. Yes
 - b. No
- 8. How much do you spend on hair products monthly?
 - a. \$1-\$30
 - b. \$31-\$60
 - c. \$61-\$90
 - d. Over \$100
- 9. How much would you be willing to pay if the hair product contained all natural and/or organic ingredients and provided the same treatment effects?
 - a. \$1-\$30
 - b. \$31-\$60
 - c. \$61-\$90
 - d. Over \$100
- 10. If there were two products being sold for the same price—one traditional and the other all natural/organic which product would you choose?
 - a. Traditional
 - b. All natural/organic
- 11. Do certified natural and/or organic seals (logos) affect your opinion of a hair product?
 - a. Yes
 - b. No
- 12. If so, please list the seals (logos) you look for when purchasing hair product.

13. Does product efficacy influence your purchasing decisions?

- a. Yes
- b. No

14. If yes, what products do you use to maintain your hair?

Shampoo: _____

Conditioner: _____

Gel: _____

Mousse: _____

Moisturizer: _____

Silkening crème: _____

15. Do you research the products you use before purchasing?

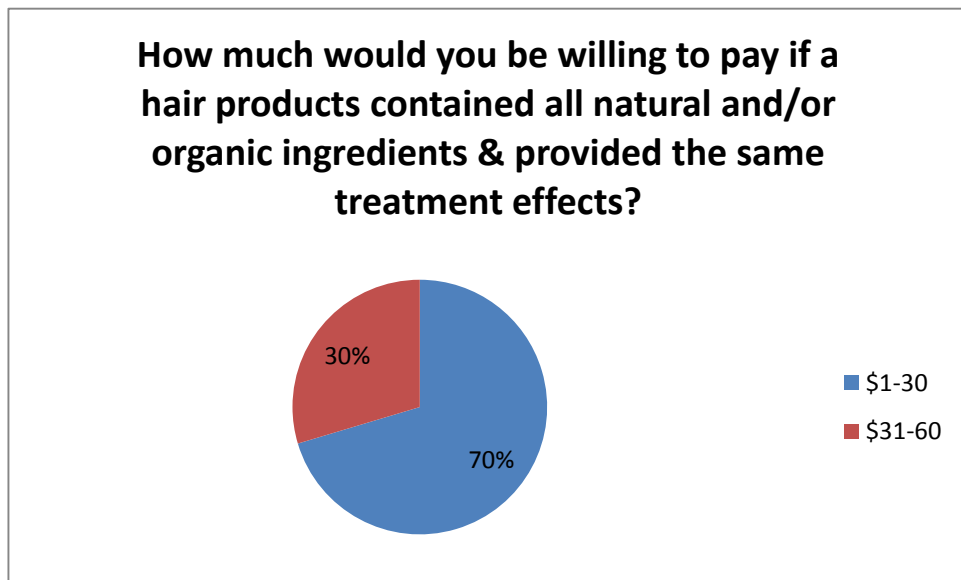
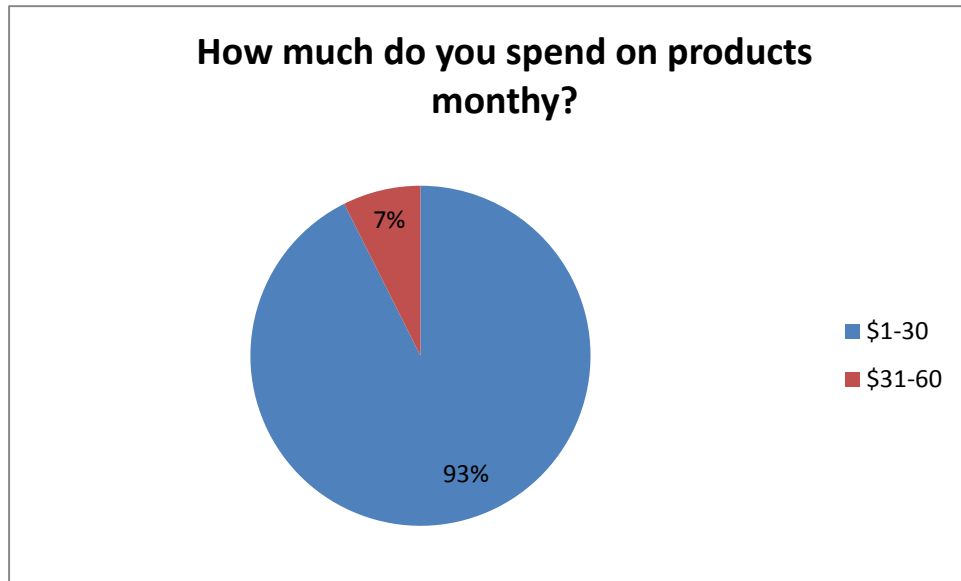
- a. Yes
- b. No

16. If yes, what does your research consist of?

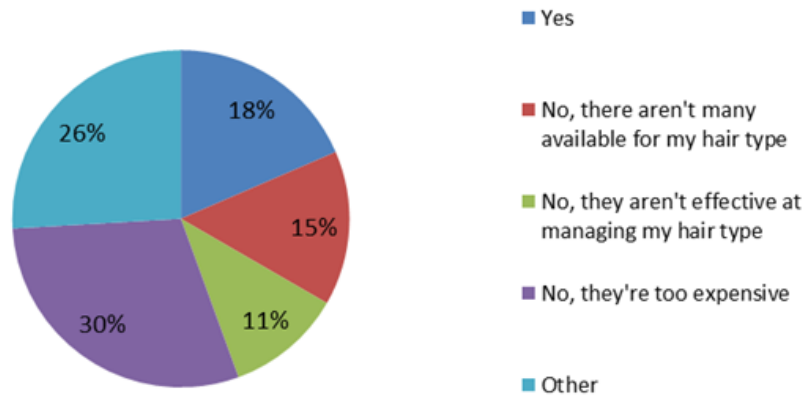
- a. Reading labels to determine whether ingredients sound harmful
- b. Asking friends about their experience with products
- c. Asking your stylist
- d. Asking your doctor
- e. Identifying ingredient effects and uses on the internet
- f. Other: _____

17. Given the health effects associated with this product, would you continue using it?

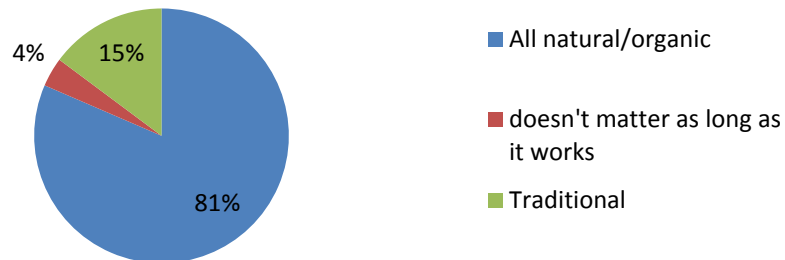
- a. Yes
- b. No

Appendix III: Graphs & Figures*Duke Students*

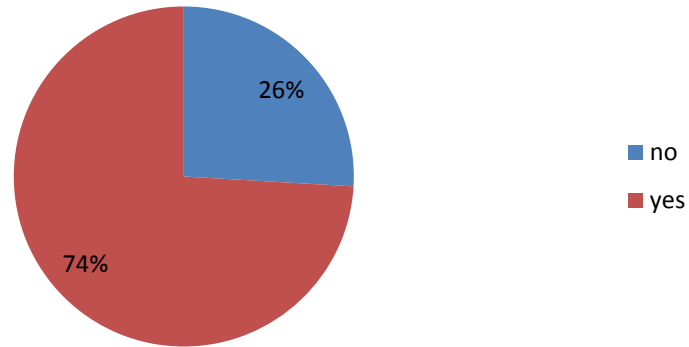
Do you use all-natural/organic products to maintain your hair?



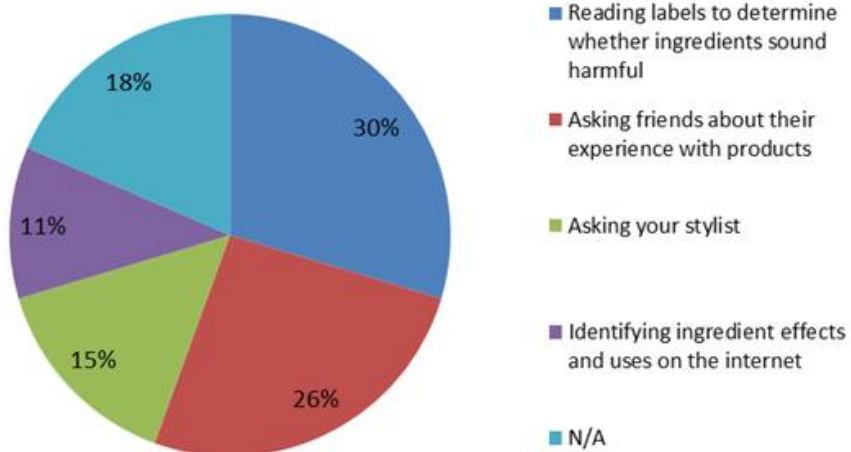
If there were two products being sold for the same price--one traditional & the other all natural/organic which product would you choose?



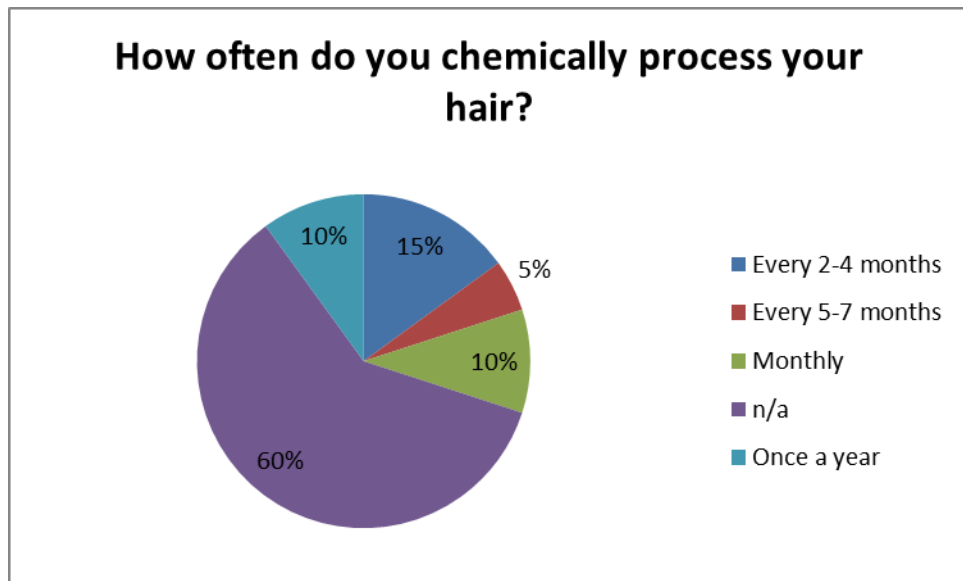
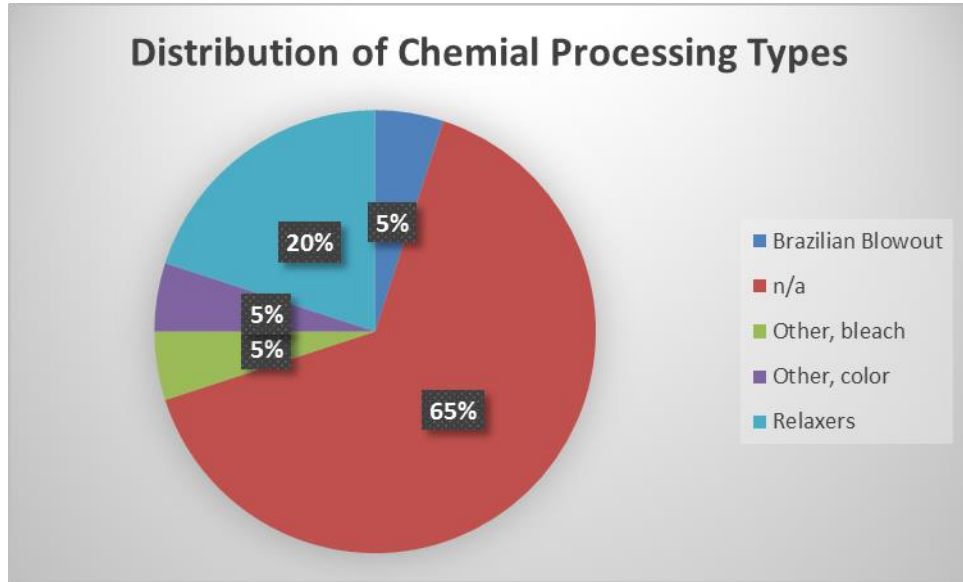
Do certified natural &/or organic seals (logos) affect your opinion of a hair product?



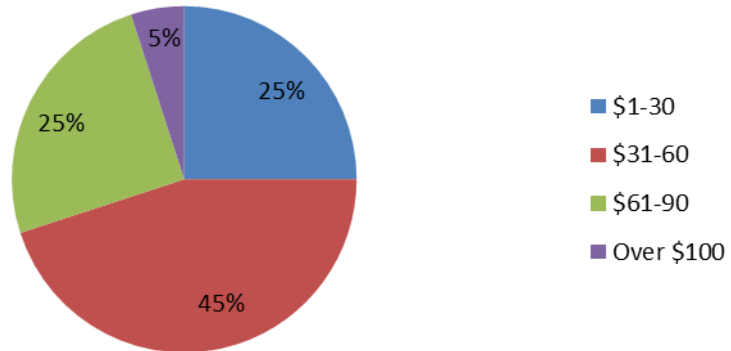
What does your research consist of?



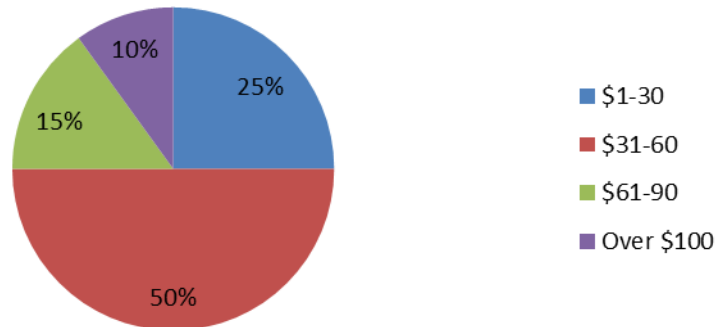
Hair Stylists



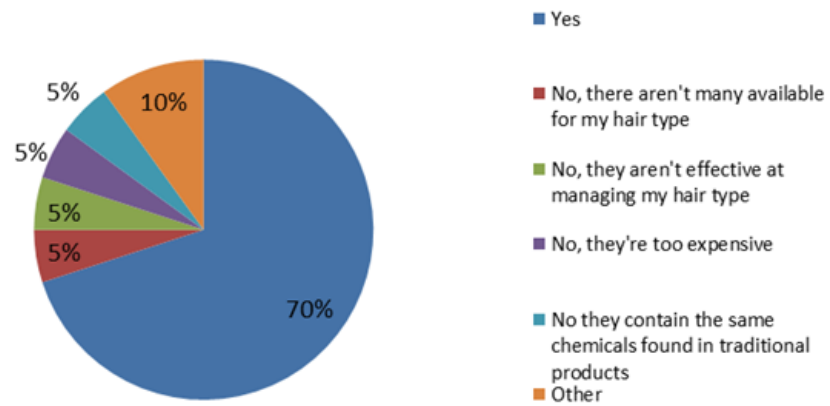
How much do you spend on hair products monthly?



How much would you be willing to pay if the hair product contained all natural and/or organic ingredients and provided the same treatment effects?

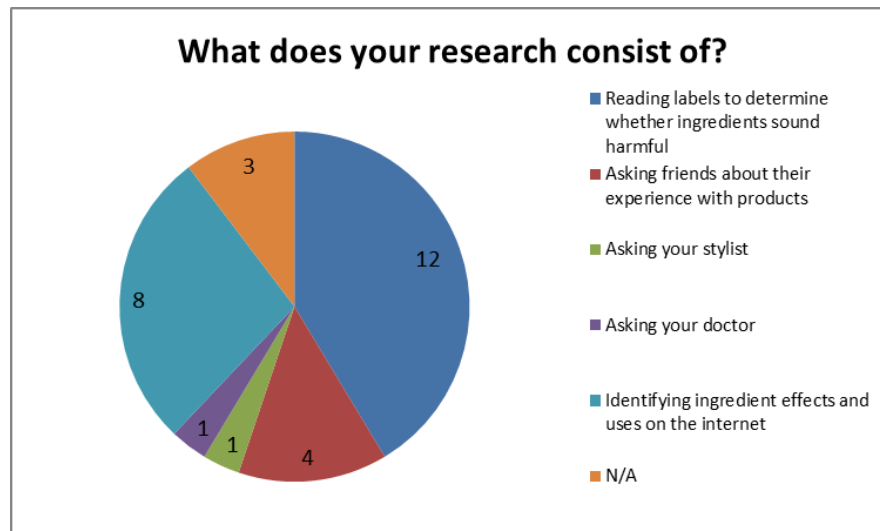


Do you use all-natural/organic products to maintain your hair?

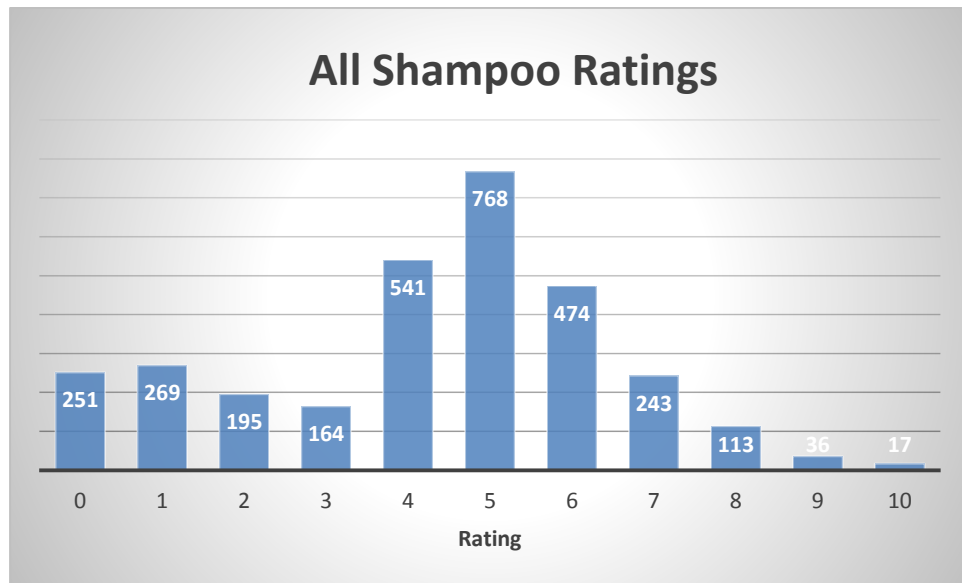
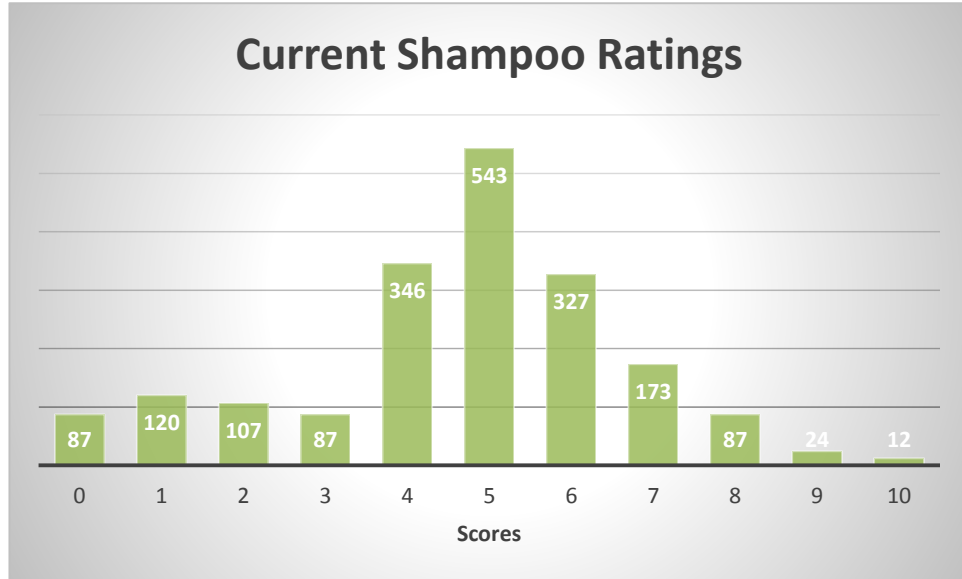


If there were two products being sold for the same price--one traditional & the other all natural/organic which product would you choose?

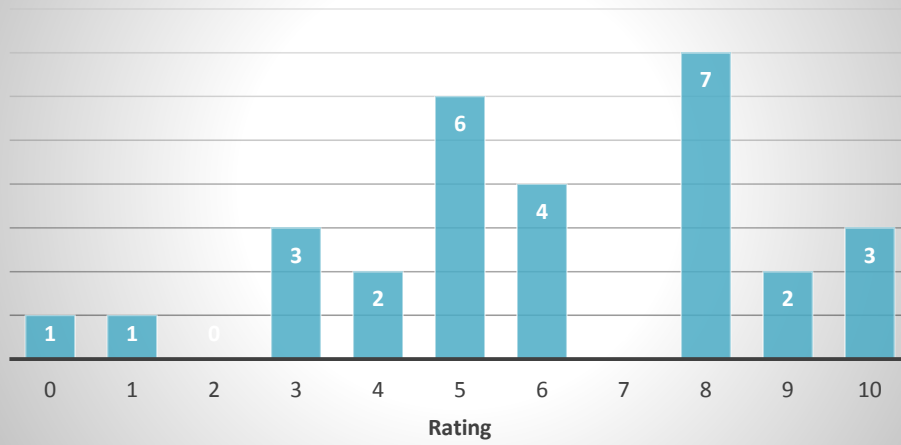




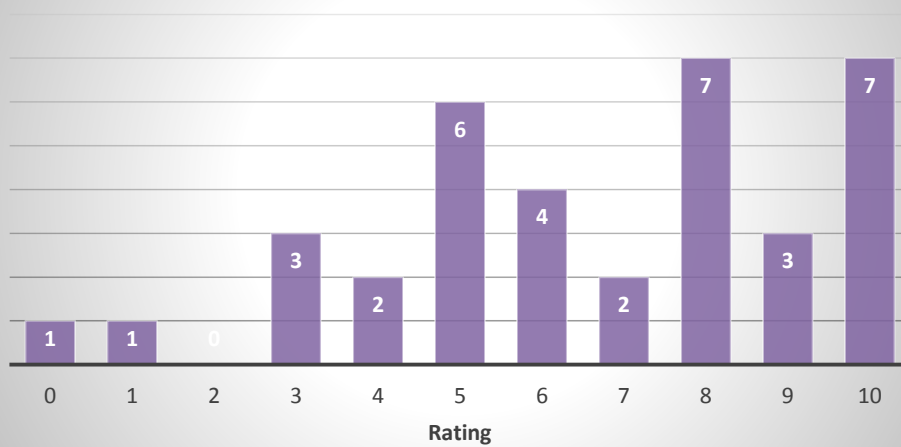
EWG Skin Deep Product Rating Distributions



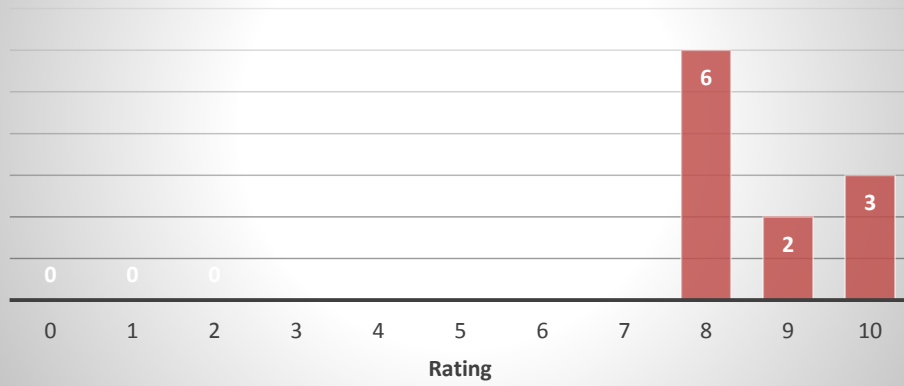
Current Straightening Product Ratings



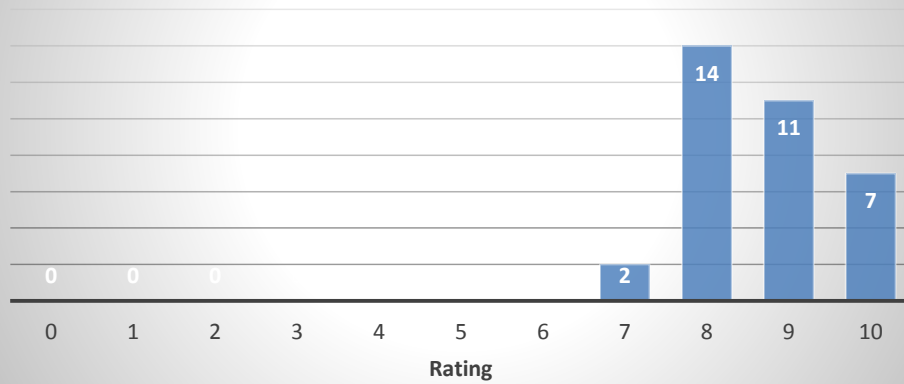
All Straightening Product Ratings

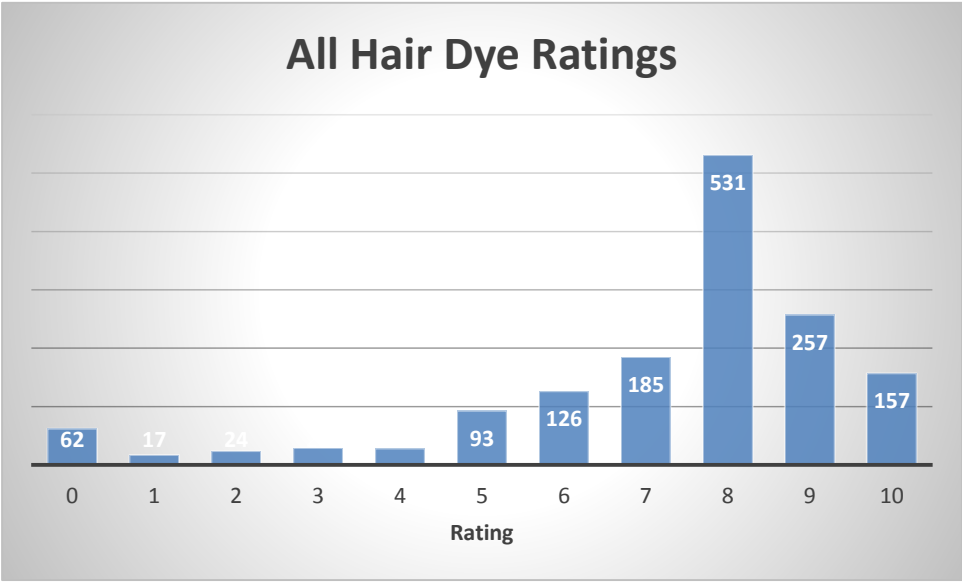
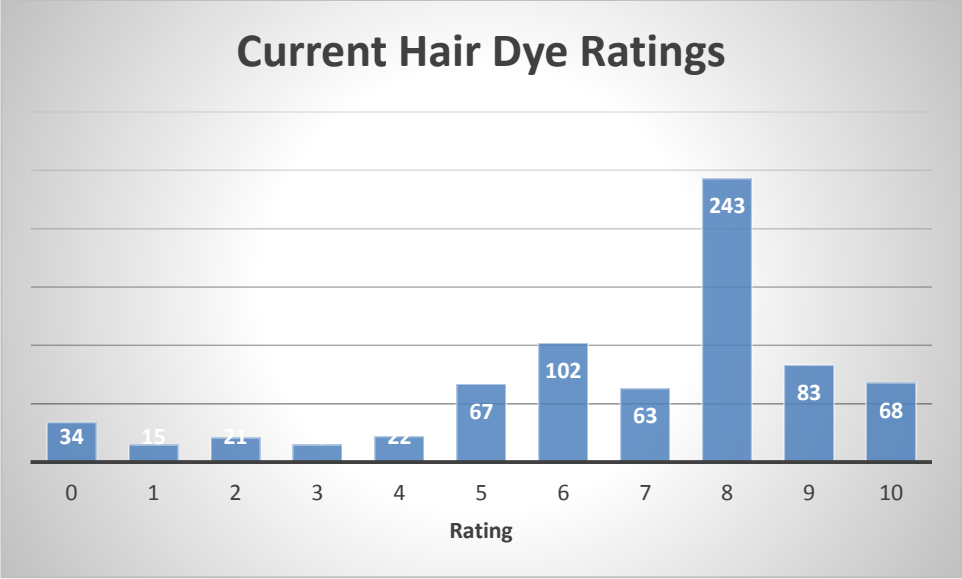


Current Ethnic Straightening Product Ratings

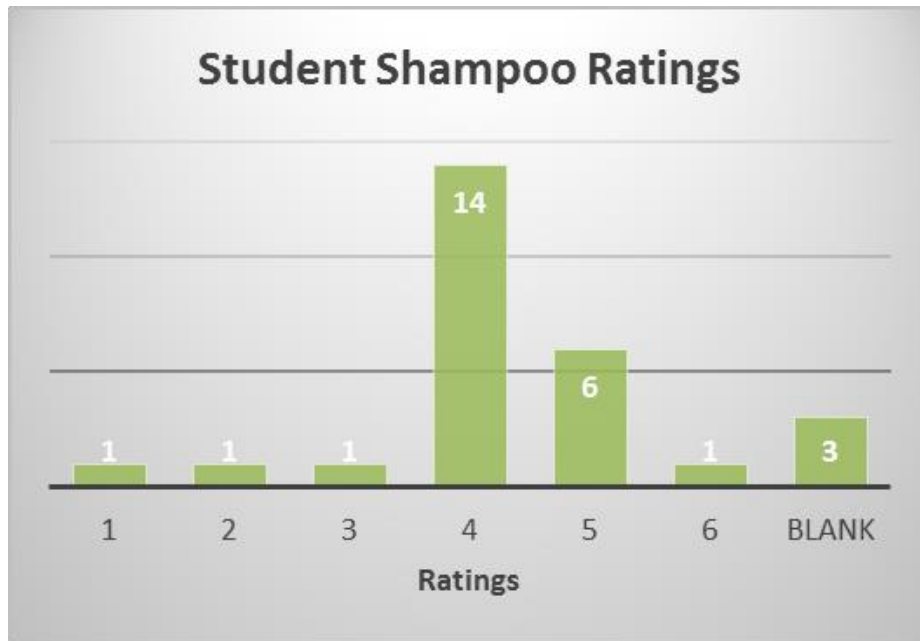


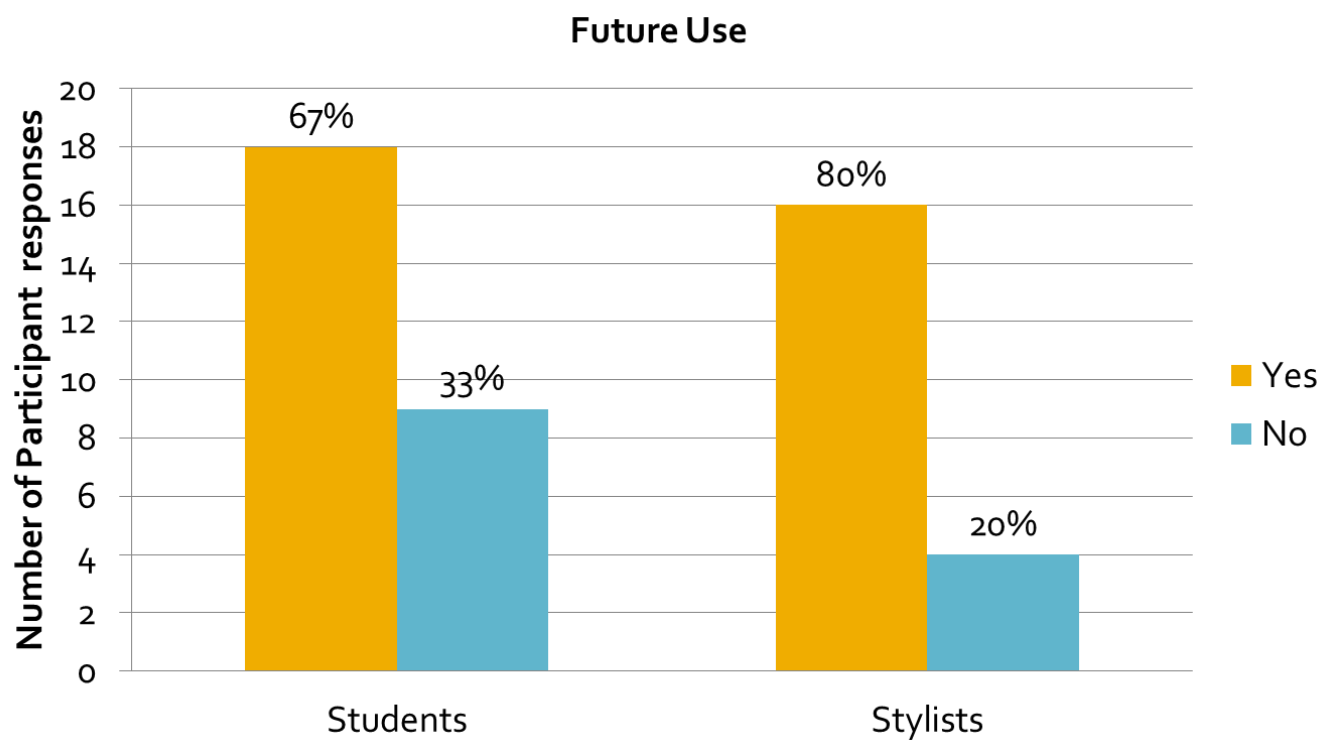
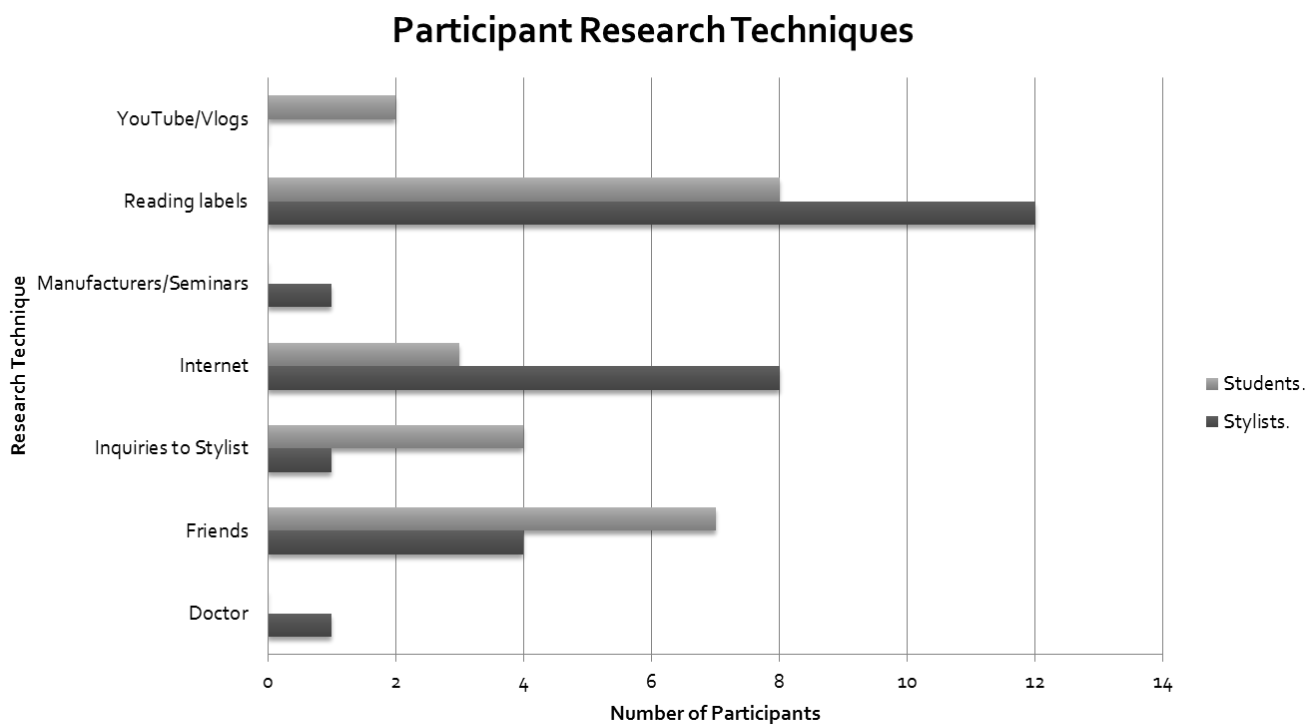
All Ethnic Straightening Product Ratings





Participant Product Ratings



A. Students vs. Stylists

Participant Shampoo Ratings

